## Space Weather Forecast

Issued on Saturday, 22 January 2022 at 00:55 Local

**This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales**

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**Space Weather Forecast Headline: Slight daily chance of G1/Minor Geomagnetic Storms from Coronal Mass Ejections (CMEs) throughout.**

**Analysis of Space Weather Activity over past 24 hours**

**Solar Activity:** Solar activity has been very low in the past 24 hours, with no significant X-ray flares recorded. The number of sunspots on the visible disc is now just two, both unipolar groups. One a small single spot approaching the southwest horizon, the other a larger single spot located towards the east of the southeast quadrant.

At 21/0900UTC, a large 'filament' (arc of plasma) disappeared from immediately north of the easternmost surviving sunspot, with a Coronal Mass Ejection (CME) following. However, results of modelling suggest the vast majority of ejecta is directed away from Earth, and is not expected to give any impacts. No other Earth-directed CMEs have been observed in available imagery.

**Solar Wind / Geomagnetic Activity:** TThe solar wind, as measured by DSCOVR and ACE at L1, was at slightly elevated levels, although showed a weak enhancement around 21/1315UTC, which along with the other solar wind parameters appeared to indicate the arrival of a weak CME, most likely from the 18th. The magnetic field of the solar wind was weak but showed a slight kick with the weak CME arrival. The important north-south component was also weak but showed a sustained slightly stronger southward trend associated with the weak transient. Quiet geomagnetic activity increased to occasionally Unsettled after midday UTC on 21st.

**Energetic Particles / Solar Radiation:** No solar radiation storms were observed this period. However, the high energy particle flux was at modestly elevated albeit background levels, and continued to show a slowly declining response from the recent S1/Minor solar radiation storm event.

**Four-Day Space Weather Forecast Summary**

**Solar Activity:** There is initially a very slight but diminishing chance of isolated Moderate flares, however this risk soon passes into the UTC weekend. Very Low solar activity is then expected, with a slight chance of Common-class flares.

**Solar Wind / Geomagnetic Activity:** There are possible CME influences on the first three days of the forecast period. A weak CME is currently passing Earth, most likely a glance from the 18th January CME. A further CME from 19th Jan is possible on the 23rd. On the 24th two CMEs, one from the 20th and another from 21st Jan, could also possibly glance past Earth, although the latter is a very low probability.

In the absence of the CMEs above, solar winds are expected to be background to slightly elevated in the short term, with an increasing chance of weak high speed stream influence developing from the second half of 23rd onwards, from CH45 and CH46.

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The resultant forecast is very low confidence in timing and phasing of G1 risk, but higher for this being the maximum attained geomagnetic activity. Outside of potential transient effects, Quiet to Unsettled activity should give way to more frequent Unsettled periods, with a chance of isolated Active intervals, from later Day 2 (23rd) associated with coronal hole influence.

**Energetic Particles / Solar Radiation:** The risk of solar radiation storms is now considered only a very slight chance and is forecast to slowly decrease back to Background levels of risk in the first half of the forecast period.

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# Met Office Space Weather Forecast

**Geomagnetic Storms:**

| Geo-Magnetic Storm Probability (Exceedance) | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Minor or Moderate | G1 to G2 | No | 20 | 20 | 20 | 20 |
| Strong | G3 | No | 1 | 1 | 1 | 1 |
| Severe | G4 | No | 1 | 1 | 1 | 1 |
| Extreme | G5 | No | 1 | 1 | 1 | 1 |

**Radio Blackouts - X Ray Flares:**

| X Ray Flares Probability | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | R1-R2 M Class | No | 5 | 1 | 1 | 1 |
| Very Active | R3 to R5 X | No | 1 | 1 | 1 | 1 |

**Solar Radiation Storms - (High Energy Protons):**

| Radiation Storms Probability (Exceedance) | Level ($cm^{-2}$ $sr^{-1}$ $s^{-1}$) | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | ≥ S1 | No | 5 | 1 | 1 | 1 |
| Very Active | ≥ S3 * | No | 1 | 1 | 1 | 1 |

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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